APPARATUS FOR BOILING EGGS

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Original application May 15, 1962, Ser. No. 194,772, now
and this application Oct. 24, 1963, Ser. No. 324,160
4 Claims. (Cl. 219—441)

This application is a division of our copending applica-
tion, Ser. No. 194,772, filed May 15, 1962, and now

This invention relates to methods and apparatuses for
boiling eggs in their shells and more particularly to an
improved method and apparatus for preparing so-called
"hot-spring eggs," that is, special soft-boiled eggs of the
type wherein the egg white is still in liquid and fluid state
while the yolk is soft-boiled.

Eggs are very important food because they contain large amounts of nutrients and can be stored over a relatively long period. However, raw eggs as well as completely boiled eggs are relatively difficult to digest, so that soft boiled eggs are preferred from the viewpoint
of digestion. While there are various methods of pre-
paring soft-boiled eggs, considerable skill and time are
required to prepare the so-called "hot-spring eggs."

This difficulty is mainly caused by the difference in
cooking or solidifying temperatures of the white and
yolk of the egg. More particularly, usually the yolk be-
gins to coagulate at a temperature in the range from 65°
C. to 67° C., while the white begins to coagulate at from
75° C. to 80° C. Moreover, as the white has relatively
low heat conductivity, in order to prepare soft-boiled eggs
of the so-called hot-spring egg type, it has been customary
to heat eggs for a longer period of time at a low tempera-
ture of about 70° C., for example, a temperature which is
insufficient to cause the white to coagulate. When cook-
ing eggs at such a low temperature, about 30 minutes are
required to prepare hot-spring eggs. If a higher tempera-
ture is utilized in order to reduce the cooking time, the
white will nearly or completely coagulate even though
the yolk is soft-boiled.

According to this invention soft-boiled eggs wherein the white is still in liquid and solid-liquid state and,
therefore, is flowable, but the yolk is soft-boiled, are ob-
tained by utilizing the relative characteristics of the
white and yolk whereby the yolk begins to coagulate at
a lower temperature than the white, the specific gravity
of the yolk is lower than that of the white, and the heat
conductivity of the yolk is higher than that of the white.

According to one embodiment of this invention, eggs
are placed in water contained in a pot which is gently
heated by an electric heater. A thermostat is provided
to deenergize the electric heater when the temperature
of the water reaches a predetermined value. Thereafter, the
eggs are cooked to soft-boiled condition by utilizing the
heat retained by the water. The temperature of the upper
portion or layers of the water in the pot is maintained
higher than the remaining portion of the water, whereby
the yolk which is floating in the upper portion of liquid-
state white is heated from above. By this novel method
of applying heat, it has been found that the so-called hot-
spring eggs can be prepared in a relatively short time.

The egg cooker constructed in accordance with the prin-
ciple of this invention comprises a pot, an electric heater
associated with the said pot, a manually-reset type elec-
 tromagnetic switch for controlling the circuit of the said
electric heater, a thermostat responsive to the tempera-
ture of water in the said pot to control the energizing cir-
cuit of said electromagnetic switch, and a temperature
indicating pilot lamp controlled by the said thermostat
to be lighted when said electric heater is deenergized and
to be extinguished when the temperature of the pot water
decreases below a predetermined value. An additional
indicating lamp may be provided in parallel with the electric
heater to be lighted when the electric heater is energized.

The features of the invention which are believed to be
novel are set forth with particularity in the appended
claims. The invention itself, however, as to its organi-
zation together with further objects and advantages thereof,
may best be understood by reference to the following de-
scription taken in connection with the accompanying
drawing, in which

FIG. 1 shows a vertical section of an egg cooker em-
bodying this invention;

FIG. 2 is a graphical representation indicating the rela-
tion between temperatures at upper and lower portions
of the water in the pot and time;

FIGS. 3, 4 and 5 are circuit diagrams of the egg cooker
embodying this invention, wherein FIG. 3 shows the con-
dition before initiating cooking operation, FIG. 4 shows
heating by an electric heater, and FIG. 5 shows the condi-
tion of heating by heat stored in the body of water in the
pot; and

FIGS. 6 and 7 are, respectively, schematic sectional
views showing pots provided with other heating means
in accordance with the present invention.

Referring now to the accompanying drawing, FIG. 1
illustrates schematically a cross section of an egg cooker
suitable for cooking eggs according to the method of this
invention. The egg cooker has a pot 1 of suitable metal
such as aluminum, the lower portion thereof being of re-
duced diameter. Around the side wall of this reduced
diameter portion is provided a suitable electric heater 2
for heating a body of water 7, contained in the pot 1, from
its outer side. The pot is surrounded by a housing 3 on
which a socket-and-plug connector 4 adapted to be con-
ected with a source of electric supply and a manual reset
type electromagnetic switch 5 are mounted. A suitable
thermostat 6 is utilized to control the energization of said
electromagnetic switch 5 in response to the temperature
of the water 7.

Referring now to FIGS. 3, 4, and 5, the manual reset
type electromagnetic switch 5 has three contacts 17, 18,
and 19 and a coil 20 and is so designed that it will close
contacts 17, 18, and 19 when manually actuated by a
handle 25 and open these contacts upon energization of
the coil 20. The coil 20 is connected to be controlled by
said thermostat 6. An indicating or pilot lamp 15 is con-
ected in parallel with the electric heater 2 via a current
limiting resistor 12 so that the lamp 15 will be lighted
when the electric heater 2 is energized. A second pilot
lamp 16 for indicating the temperature of the egg cooker
is connected across the resistor 13 so that it will be
lighted when the heater 2 is deenergized and be extin-
guished when the temperature of the egg cooker decreases
below a predetermined value. As is the practice well
known in the art, a temperature-responsive fuse 11 is in-
cluded in series with the electric heater 2.

The operation of the egg cooker of the above-described
construction is as follows:

A suitable quantity of water 7 and one or several eggs
are placed in the pot 1. By the reason given hereinafter,
it is advantageous to orientate the eggs horizontally as
shown in FIG. 1. Then the handle 25 is manipulated to
close the contacts 17, 18, and 19 of the electromagnetic
switch 5 as shown in FIG. 4, thus initiating heating opera-
tion of the pot 1. At the same time, the pilot lamp 15
is lit to indicate that the electric heater 2 is being ener-
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In order to create a temperature difference between the upper and lower portions of the water, any suitable method of heating other than that shown and described may be utilized. For example, and as shown in FIG 6, the electric heater 21 may be formed as a disc of a nature such as to float on the surface of the water. Heater 21 is provided with leads 22 which are led out over the upper periphery of pot 1. A thermostat 5 may be mounted in the pot 1, in the same manner as shown in FIG 1, so as to be responsive to the temperature of the upper portion of the water in pot 1. In the arrangement shown in FIG 6, the yolk 9 is floated directly from above, and the water in the lower portion of pot 1 is heated by heat conduction along the side wall of the pot.

It is also possible, as shown in FIG 7, to submerge the disc-shaped heater 21 at the bottom of the pot and, in this case, a disc or shallow cup of heat insulating material, indicated at 23, and having an outer diameter somewhat smaller than the inside diameter of the pot 1, is placed directly on top of the heater 21 between the eggs and the heater in order to cause heated water to rise along the inner surface of the pot without directly contacting the eggs. Again, the leads 22 of the heater are brought out over the upper edge of pot 1. A thermostat 5 may be mounted in the cup 23, in the same manner as the thermostat 5 is mounted in the pot 1 in FIG 1, so as to be responsive to the temperature of the upper portion of the water.

Thus, according to this invention, soft-boiled eggs of the so-called hot-spring type can be cooked in a relatively short period without any special skill. Moreover, the egg cooker of this invention not only can cook eggs in the desired manner, but also is convenient in use because it provides indications of heating by electricity, cooking by stored heat and completion of cooking.

In accordance with the provisions of the patent statutes we have explained the principle and operation of our invention and have illustrated and described what we consider to represent the best embodiment thereof. However, we desire to have it understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An egg cooker comprising a pot having a substantially flat and horizontal bottom support surface and adapted to support eggs to be cooked therein in a substantially horizontal orientation and to adjacent immersing said eggs therein, an elongated thermostat extending centrally and vertically upwardly in said pot to be responsive to the temperature of the upper portion of said body of water, an electric heater operatively associated with said pot to heat the water therein, and positioned above the bottom of the pot so as to create a predetermined temperature difference between the upper and lower portions of said body of water, an energizing circuit for energizing said heater, and an electric switch provided in said energizing circuit and operatively associated with said thermostat so as to be actuated by said thermostat to control said electric heater, said thermostat operating said switch to de-energize said electric heater responsive to a predetermined temperature of the upper portion of the water zone, at which predetermined temperature the white of said eggs begins to coagulate, said thermostat extending centrally and vertically upwardly from said shallow dish.

2. An egg cooker, as claimed in claim 1, in which said electric switch is a manually re-set electromagnetic switch actuated automatically by said thermostat.

3. An egg cooker according to claim 1, wherein said electric heater is of a disc form and is adapted to be disposed in said pot on the bottom wall thereof, and said support surface is comprised in a shallow dish of heat insulating material positioned on said electric heater and
arranged to support the eggs in such substantially horizontal orientation, said thermostat extending centrally and vertically upwardly from said shallow dish.

4. An egg cooker comprising a pot adapted to contain a body of water and have a substantially flat and horizontal bottom support surface to support eggs to be cooked in a substantially horizontal orientation, and to contain water of an amount immersing said eggs therein, and a relatively elongated thermostat extending into the pot from the center of the bottom of the pot and with its longitudinal axis extending vertically, so as to be responsive to the temperature of the upper portion of said body of water, an electric heater floating on the surface of the water in said pot above the upper end of said thermostat, said heater being of disc form and arranged to heat said eggs from above, an energizing circuit for energizing said heater, an electric switch provided in said energizing circuit and operatively associated with said thermostat so as to be actuated by said thermostat to control said electric heater, said thermostat operating said switch to deenergize said electric heater responsive to a pre-determined temperature of the upper portion of the water zone, at which pre-determined temperature the yolk of said eggs begins to coagulate, said predetermined temperature being in the range from 75° to 80° C.

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